KA

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/553,956	04/21/2000	Thomas A. Runkler	50277-452	7423

7590 05/20/2004

Stephen C Carlson
Ditthavong & Carlson P C
10507 Braddock Road
Suite A
Fairfax, VA 22032

EXAMINER	
PHAM, HUNG Q	
ART UNIT	**PAPER NUMBER**
2172	18

DATE MAILED: 05/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/553,956	Applicant(s) RUNKLER ET AL.	
	Examiner HUNG Q PHAM	Art Unit 2172	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 April 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8,10,12-25,27 and 29-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *7,8,24 and 25* is/are allowed.

6)☒ Claim(s) *1-6,10,12-14,16-23,27,29-31 and 33-36* is/are rejected.

7)☒ Claim(s) *15 and 32* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-8, 10, 12-25, 27 and 29-36 are pending.

Response to Arguments

2. Applicant's arguments filed 04/01/2004 have been fully considered but they are not persuasive.

(a) As argued by applicant with respect to claim 17 and 34 on page 15:

> *Accordingly, unless something explicitly stated to be prior art, the mere inclusion of subject matter in the background section is not sufficient by itself to be an admission to be prior art.*

Examiner respectfully traverses because the ID3 is explicitly admitted by applicant as a conventional approach (background, page 3, lines 11-12). Thus, the admission is sufficient by itself to be prior art.

(b) As argue by applicant with respect to claims 17 and 34 on page 15:

> *However, neither the Background nor Janikow disclose the features of claims 17 and 34. For example, claims 17 and 34 recite: selecting the one of the features corresponding to the maximal partition coefficient.*

Examiner respectfully traverses because of the following reasons:

As admitted by applicant, a branch node is created and the attribute with the highest information gain is selected if that attribute were used to discriminate objects at the branch node (page 3, lines 15-16). As seen, the attribute corresponding to the highest information gain as ***maximal partition coefficient*** is selected to create a branch node.

(c) As argued by applicant on page 15:

In FID3, on the other hand, an attribute is chosen based on a maximum information gain, which is based on entropy instead of partition coefficients. The statement of the rejection appears to construe the term "maximum information gain" to cover partition coefficient, but as disclosed in the Background and in Janikow such an interpretation of a reference is inconsistent with what one of ordinary skill in the art would understand "maximum information gain" to be.

Examiner respectfully traverses because the Manual of Patent Examining Procedure § 2111 states that *during patent examination, the pending claims must be given their broadest reasonable interpretation consistent with the specification*. As defined in the specification, page 15, lines 3-4, *a partition coefficient, which quantifies the goodness of the clustering*. Thus, ***a maximal partition coefficient*** is considered as a number, for example, that indicates a highest measurement of division property. As disclosed in the Background, the ID3 is a recursive algorithm that starts with a set of training objects that belong to a set of predefined classes. If all the objects belong to a single class, then there is no decision to make and a leaf node is created and labeled with the class. Otherwise, a branch node is created and the attribute with the highest information gain is selected if that attribute were used to discriminate objects at the branch node. The information gain is calculated by finding the average entropy of each attribute (page 3, lines 15-17). As seen, each attribute associates with a calculated information gain, and the attribute with the highest information gain is selected for branching the node if that attribute is able to discriminate objects. Thus, the highest information gain is equated with the ***maximal partition coefficient*** because it *quantifies the goodness of the clustering.*

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-3 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rastogi et al. [USP 6,247,016 B1] in view of Shimoji et al. [Data Clustering with Entropical Scheduling].

Regarding to claims 1 and 18, Rastogi teaches a method and a computer readable medium bearing instruction for classifying data using a decision tree. As shown in FIG. 1, there is a single record corresponding to each loan request,

characterized two attributes, salary and education level completed (Col. 2, lines 50-56). As shown in FIG. 2, `salary` is selected ***from among the features characterizing the data associated with*** the root node, and the test *`is the salary level of the applicant less than $20,000.00`* (Col. 2, lines 62-63) is to split the root node N into N_1 and N_2 (FIG. 3, line 8). The test is based on the process of calculation of the least entropy by scanning the attribute list from the beginning to calculate an entropy for each split point or each numeric attribute in order to determine the least entropy (Col. 4, lines 25-52). In short, the technique as discussed indicates the steps of ***selecting a feature from among the features characterizing the data associated with the node***, and the process of determining the least entropy as ***performing a cluster analysis along the selected feature to group the data into one or more cluster***. The left arc that connects the root node to node 30 is labeled *YES* indicating that node 30 is to be reached if the `salary < $20,000`. On the other hand, the right arc connects root node to another branch node is labeled *NO* indicating the branch node is to be reached if `salary > $20,000`. The branch node is labeled *ACCEPT* (FIG. 2). This performs the claimed ***constructing one or more arcs of the decision tree at the node respectively for each of the one or more clusters***. As in FIG. 1, the first applicant has a salary of $15,000. Thus, at root node 10, the condition yields a *YES*, the attributes of this first applicant are passed on to the left branch, where an additional test takes place. If the condition resulted in a *NO* answer, the attribute of this applicant would have been passed to the right branch and leaf 20 would have been formed, classifying this applicant in the class of applicants whose loan request is accepted (Col. 3, lines 46-58). As seen, the attributes of first

record are passed to the left branch to node 30 characterized by `Education` feature for another test, and the attributes of second record are passed to the right branch to node 20 characterized by `ACCEPT` attribute as the step of ***projecting the data in each of the clusters, wherein the projected data are characterized by the plurality of the features but for the selected feature***. As shown in FIG. 3 is the procedure to build the decision tree. A loop is set up at line 3, the root node is queued at line 2 and de-queued at line 4, root node is split into nodes 30 and 20 at line 8, appended to the queue at line 9 (FIG. 3). The procedure is recursively performed on node 30 at line 3 with another process of calculation of the least entropy and another test for `Education` as the selected and projected feature (Col. 3, lines 5-9). As seen, the procedure of building decision tree with a loop as discussed indicates the step of ***recursively performing the steps of selecting a feature and performing the cluster analysis on the projected data in each of the cluster***. Rastogy does not explicitly teach the cluster analysis is ***based on distances between the data and respective one of more centers of the one or more clusters***. Shimoji discloses a method of clustering a set of data by using a clustering error ***based on distances between the data and respective one of more centers of the one or more clusters*** (Shimoji, Introduction). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to combine clustering error as taught by Shimoji to analyze a cluster when grouping data into one or more cluster of a decision tree.

Regarding to claims 2 and 19, Rastogi and Shimoji teaches all the claimed subject matters as discussed in claims 1 and 18, Rastogi further discloses the steps of

performing a plurality of cluster analyses along each of the features to calculate a maximal cluster validity measure, said maximal cluster validity measure corresponding to one of the features; and selecting the one of the features that corresponds to the maximal cluster validity measure (Col. 4, lines 25-52).

Regarding to claims 3 and 20, Rastogi and Shimoji teaches all the claimed subject matters as discussed in claims 2 and 19, Rastogi further discloses the step: *for each of the features, performing a plurality of cluster analyses along said each of the features for a plurality of cluster numbers to calculate respective partition coefficients; and determining the maximal cluster validity measure from among the partition coefficients* (Col. 4, lines 25-52).

5. Claims 4 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rastogi et al. [USP 6,247,016 B1] in view of Shimoji et al. [Data Clustering with Entropical Scheduling] and Applicant Admitted Prior Art [Background Of The Invention, pages 1-5].

Regarding to claims 4 and 21, Rastogi teaches all the claimed subject matters as discussed in claims 1 and 18, but fails to disclose the step of *performing the cluster analysis includes the step of performing a fuzzy cluster analysis*. Applicant Admitted Prior Art teaches the technique of using fuzzy cluster analysis for a decision tree (page 4, lines 1-5). Therefore, it would have been obvious for one of ordinary skill in the art at the time

the invention was made to modify the Rastogi method by using fuzzy cluster analysis for a decision tree as taught in the admission in order to calculate the maximizing information gains.

6. Claims 5 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rastogi et al. [USP 6,247,016 B1] in view of Shimoji et al. [Data Clustering with Entropical Scheduling], Applicant Admitted Prior Art [Background Of The Invention, pages 1-5] and Hall et al. [Generating Fuzzy Rules from Data].

Regarding to claims 5 and 22, Rastogi and Applicant Admitted Prior Art teaches all the claimed subject matters as discussed in claims 4 and 21, but fails discloses the step of *performing the fuzzy cluster analysis includes the step of performing a fuzzy c-means analysis*. Hall teaches the technique of using fuzzy c-means for a decision tree (Hall, Generating Fuzzy Rules from Data). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the Rastogi and Applicant Admitted Prior Art method by including the technique of using fuzzy c-means in order to determine the number of cluster.

7. Claims 6 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rastogi et al. [USP 6,247,016 B1] in view of Shimoji et al. [Data Clustering with Entropical Scheduling] and Shafer et al. [SPRINT: A Scalable Parallel Classifier for Data Mining].

Regarding to claims 6 and 23, Rastogi teaches all the claimed subject matters as discussed in claims 1 and 18, but fails to disclose the step of ***performing the cluster analysis includes the step of performing a hard cluster analysis***. Shafer teaches a method of forming a decision tree by performing a hard cluster analysis (Shafer, SPRINT: A scalable Parallel Classifier for Data Mining, pages 544-550, especially Abstract and Introduction pages 544-545). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the Rastogi method by including the technique of hard cluster analysis in order to optimize the system by using a regular cluster for classifying records of unknown class.

8. Claims 1-5 and 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Janikow [Fuzzy Decision Trees: Issues and Method] in view of Choe et al. [On the Optimal Choice of Parameters in a Fuzzy C-Means Algorithm].

Regarding to claims 1 and 18, Janikow teaches method of building a fuzzy decision tree. To simplify the method, FIG. 4 & 5 on pages 8-9 could be used to illustrate the Janikow method. As shown in Janikow FIG. 8, *Employment* at the root node or *Income* at a sub node as ***a selected feature from among the features characterizing the data associated with the node*** for ***constructing*** Low, Medium and High, which are ***one or more arcs of the decision tree at the node respectively for each of the one or more clusters***, and ***projecting the data in each of the clusters, wherein the projected data are***

characterized by the plurality of the features but for the selected feature. Janikow further discloses the step of ***performing a cluster analysis along the selected feature to group the data into one or more clusters***, and ***recursively performing the steps of selecting a feature and performing the cluster analysis on the projected data in each of the clusters*** (Janikow, pages 7-9, Procedure to Build a Fuzzy Decision Tree). Janikow does not explicitly illustrate the cluster analysis is ***based on distances between the data and respective one or more centers of the one or more cluster***. Choe discloses a Fuzzy C-Means Algorithm to maximize the number of data points in a cluster by using a fuzzy constraint. The Choe cluster analysis is ***based on distances between the data and respective one or more centers of the one or more cluster*** (Choe, Fuzzy C-Means Algorithm, pages 350-351). It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the Janikow method by using the error constraint based on the distance between data and center of cluster to build a decision tree in order to maximize the number of data points in a cluster.

Regarding to claims 2 and 19, Janikow and Choe teaches all the claimed subject matters as discussed in claims 1 and 18, Choe further discloses the steps of ***performing a plurality of cluster analyses along each of the features to calculate a maximal cluster validity measure, said maximal cluster validity measure corresponding to one of the features; and selecting the one of the features that corresponds to the maximal cluster validity measure*** (Choe, Fuzzy C-Means Algorithm, pages 350-351).

Regarding to claims 3 and 20, Janikow and Choe teaches all the claimed subject matters as discussed in claims 2 and 19, Choe further discloses the step *performing a plurality of cluster analyses along said each of the features for a plurality of cluster numbers to calculate respective partition coefficients; and determining the maximal cluster validity measure from among the partition coefficients* (Choe, Fuzzy C-Means Algorithm, pages 350-351).

Regarding to claims 4 and 21, Janikow and Choe teaches all the claimed subject matters as discussed in claims 1 and 18, Janikow further discloses the step of *performing the cluster analysis includes the step of performing a fuzzy cluster analysis* (Janikow, page 6, Fuzzy Decision Tree).

Regarding to claims 5 and 22, Janikow and Choe teaches all the claimed subject matters as discussed in claims 4 and 21, Choe further discloses the step of *performing the fuzzy cluster analysis includes the step of performing a fuzzy c-means analysis* (Choe, Fuzzy C-Means Algorithm, pages 350-351).

9. Claims 6 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Janikow [Fuzzy Decision Trees: Issues and Method] in view of Choe et al. [On the Optimal Choice of Parameters in a Fuzzy C-Means Algorithm] and Shafer et al. [SPRINT: A Scalable Parallel Classifier for Data Mining].

Regarding to claims 6 and 23, Janikow and Choe teaches all the claimed subject matters as discussed in claims 1 and 18, but fails to disclose the step of ***performing the cluster analysis includes the step of performing a hard cluster analysis***. Shafer teaches a method of forming a decision tree by performing a hard cluster analysis (Shafer, SPRINT: A scalable Parallel Classifier for Data Mining, pages 544-550, especially Abstract and Introduction pages 544-545). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the Janikow and Choe method by including the technique of hard cluster analysis in order to optimize the system by using a regular cluster for classifying records of unknown class.

10. Claims 10, 12, 16, 27, 29 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Janikow [Fuzzy Decision Trees: Issues and Method].

Regarding to claims 10 and 27, Janikow teaches a method for generating a decision tree for a plurality of data characterized by a plurality of features (TABLE 1, FIG. 4, page 8). As illustrated by Janikow in the procedure to build a Fuzzy Decision Tree on pages 7-8, a plurality of cluster analyses as in pages 7-8 along `Employment` and `Income` to calculate a plurality of information gain to split the node as ***partition coefficients*** (G^R_{Inc}, G^R_{Emp}), *Emp* is the selected attribute corresponds to G^R_{Emp} as ***a maximal partition coefficient*** from among the G^R_{Inc}, and G^R_{Emp} as partition coefficients. The root gets expanded with the following three children based on the selected Emp, and the decision tree is built based on the three children as in FIG. 4. In short, the

Janikow technique of building the decision tree indicates the steps of ***performing a plurality of cluster analyses along each of the features to calculate a plurality of respective partition coefficients based on membership functions of the data for one or more clusters in respective said cluster analyses, selecting the one of the features corresponding to a maximal partition coefficient from among the partition coefficients***; ***subdividing the data into one or more groups based on the selected feature***; and ***building the decision tree based on the one or more groups***. Janikow does not explicitly teach the G^R_{Inc}, and G^R_{Emp} as ***the partition coefficients based on membership functions of the data for one or more clusters in respective said cluster analyses***. However, as disclosed by Janikow, at each node, the set of remaining attributes from $V - V^N$ is searched, I superscript S^N_{Vi} is calculated, and information gain as ***partition coefficient*** $G^N_i = I^N$ - I superscript S^N_{Vi}. As seen, obviously, G^N_i as ***partition coefficient*** depends on the value of I superscript S^N_{Vi} that is based on the function f_2 of data for the corresponding cluster of FIG. 4 in respective cluster analyses. It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the Janikow method by using function f_2 as the membership function for calculating information gain as ***partition coefficient*** in order to split a node based on the attribute that has the highest information gain.

Regarding to claims 12 and 29, Janikow teaches all the claimed subject matters as discussed in claims 10 and 27, Janikow further discloses the step of ***performing a plurality of fuzzy cluster analyses*** (pages 7-8).

Regarding to claims 16 and 33, Janikow teaches all the claim subject matters as discussed in claims 10 and 27, Janikow further discloses the step of *projecting the data in each of the group, wherein the projected data are characterized by the plurality of the features but for the selected feature; and recursively performing the steps of selecting a feature, comprising selecting a new one of the features corresponding to a new maximal partition coefficient and subdividing the data into one or more new groups based on the selected new feature* (Janikow, pages 7-9, Procedure to Build a Fuzzy Decision Tree).

11. Claims 13 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Janikow [Fuzzy Decision Trees: Issues and Method] in view of Choe et al. [On the Optimal Choice of Parameters in a Fuzzy C-Means Algorithm].

Regarding to claims 13 and 30, Janikow teaches all the claim subject matters as discussed in claims 10 and 27, Janikow does not explicitly teach the step of *performing the fuzzy cluster analyses includes the step of performing a plurality of fuzzy c-means analyses*. Choe discloses a Fuzzy C-Means Algorithm to maximize the number of data points in a cluster by using a fuzzy constraint (Choe, On the Optimal Choice of Parameters in a Fuzzy C-Means Algorithm). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to use the fuzzy c-means analyses as taught by Choe in order to maximize the number of data points in a cluster.

12. Claims 14 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Janikow [Fuzzy Decision Trees: Issues and Method] in view of Shafer et al. [SPRINT: A Scalable Parallel Classifier for Data Mining].

Regarding to claims 14 and 31, Janikow teaches all the claimed subject matters as discussed in claims 1 and 18, but fails to disclose the step of ***performing the cluster analysis includes the step of performing a hard cluster analysis***. Shafer teaches a method of forming a decision tree by performing a hard cluster analysis (Shafer, SPRINT: A scalable Parallel Classifier for Data Mining, pages 544-550, especially Abstract and Introduction pages 544-545). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the Janikow method by including the technique of hard cluster analysis in order to optimize the system by using a regular cluster for classifying records of unknown class.

13. Claims 17 and 34-36 are rejected under 35 U.S.C. 102(e) as being anticipated by Applicant Admitted Prior Art [Background Of The Invention, pages 1-5].

Regarding to claims 17 and 34, in the background, applicant admitted a conventional method for generating a decision tree for a plurality of data. As disclosed in the admission, FID3 generates its decision tree by maximizing information gains. The decision of the fuzzy decision tree is also a fuzzy variable, indicating the memberships

of a tested object in each of the possible classifications (page 4, lines 13-15). Rather than categorize a patient's age as "twelve years and below" and "above twelve years," two fuzzy sets, `Young` and `Old`, can be employed, such that a two-year old may have a membership function in the `Young` fuzzy set $\mu_{young}(2) = 0.99$ but a membership function in the `Old` fuzzy set $\mu_{old}(2) = 0.01$ (page 4, lines 1-5). A branch node is created and the attribute with the highest information gain is selected if that attribute were used to discriminate objects at the branch node (page 3, lines 15-16). As seen, $\mu_{young}(X_i)$ and $\mu_{old}(X_i)$ as a plurality of fuzzy cluster analyses is performed along each of the age features to calculate the highest information gain corresponding to one of the features as ***maximal partition coefficient*** and for two fuzzy sets `Young` and `Old`, then the attribute with the highest information gain is selected to discriminate objects at the branch node to build the decision tree based on two fuzzy sets `Young` and `Old`. In other words, the admission performs the claimed ***performing a plurality of fuzzy cluster analysis along each of the features to calculate a maximal partition coefficient and a corresponding set of one or more fuzzy clusters, said maximal partition coefficient corresponding to one of the features; selecting the one of the features corresponding to the maximal partition coefficient; building the decision tree based on the corresponding set of one or more fuzzy clusters***.

Regarding to claims 35 and 36, the admission teaches all the claimed subject matters as discussed in claims 17 and 34, the admission further discloses ***the maximal partition is based on membership functions of the data for the set of one or more clusters*** (page 4, lines 10-15).

Allowable Subject Matter

14. Claims 15 and 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding to claims 15 and 32, the closet available prior arts, USP 6,247,016 B1, issued to Rastogi and Janikow (Fuzzy Decision Trees: Issues and Method) also teaches the technique of refining a node of a decision tree. However, as in claims 15 and 32, Rastogi and Janikow fails to teach or suggest the steps of *calculating a domain ratio of a difference in domains limits of the data over a difference in domain limits of a superset of the data; determining whether the domain ratio has a predetermined relationship with a predetermined threshold; and if the domain ratio has the predetermined relationship with the predetermined threshold, then grouping the data into a single cluster*. Therefore, the invention is allowable over the prior arts of record for being directed to a combination of claimed elements including the providing steps as indicated above.

15. Claims 7-8 and 24-25 are allowed.

Regarding to claims 7-8 and 24-25, the closet available prior arts, USP 6,247,016 B1, issued to Rastogi and Janikow (Fuzzy Decision Trees: Issues and Method) also teaches the technique of refining a node of a decision tree. However, as in claims 7-8 and 24-25, Rastogi and Janikow fails to teach or suggest the steps of *calculating a domain ratio of a difference in domains limits of the data over a difference in domain limits of*

a superset of the data; determining whether the domain ratio has a predetermined relationship with a predetermined threshold; and if the domain ratio has the predetermined relationship with the predetermined threshold, then grouping the data into a single cluster. Therefore, the invention is allowable over the prior arts of record for being directed to a combination of claimed elements including the providing steps as indicated above.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUNG Q PHAM whose telephone number is 703-605-4242. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, JOHN E BREENE can be reached on 703-305-9790. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Examiner Hung Pham
May 11, 2004

SHAHID ALAM
PRIMARY EXAMINER